

Development of innovative acetification processes and products



Andrea Bezzecchi (102408@studenti.unimore.it)

Dept. of Life Science, PhD Student in Agri-Food Sciences, Technologies and Bio-Technologies

University of Modena and Reggio Emilia, Italy

Tutor: Dott.ssa. Maria Gullo

Objective to develop an innovative acetification system as well as new products based on unconventional raw materials. New raw materials and acetification processes will be studied and prototypal scale productions will be implemented.

Activities of the first year

- Extensive collection and study of scientific literature focused on unconventional raw materials used as fermentative substrate for acetic fermentation, their composition, suitability for fermentation and availability system
- Laboratory and prototypal scale experiments

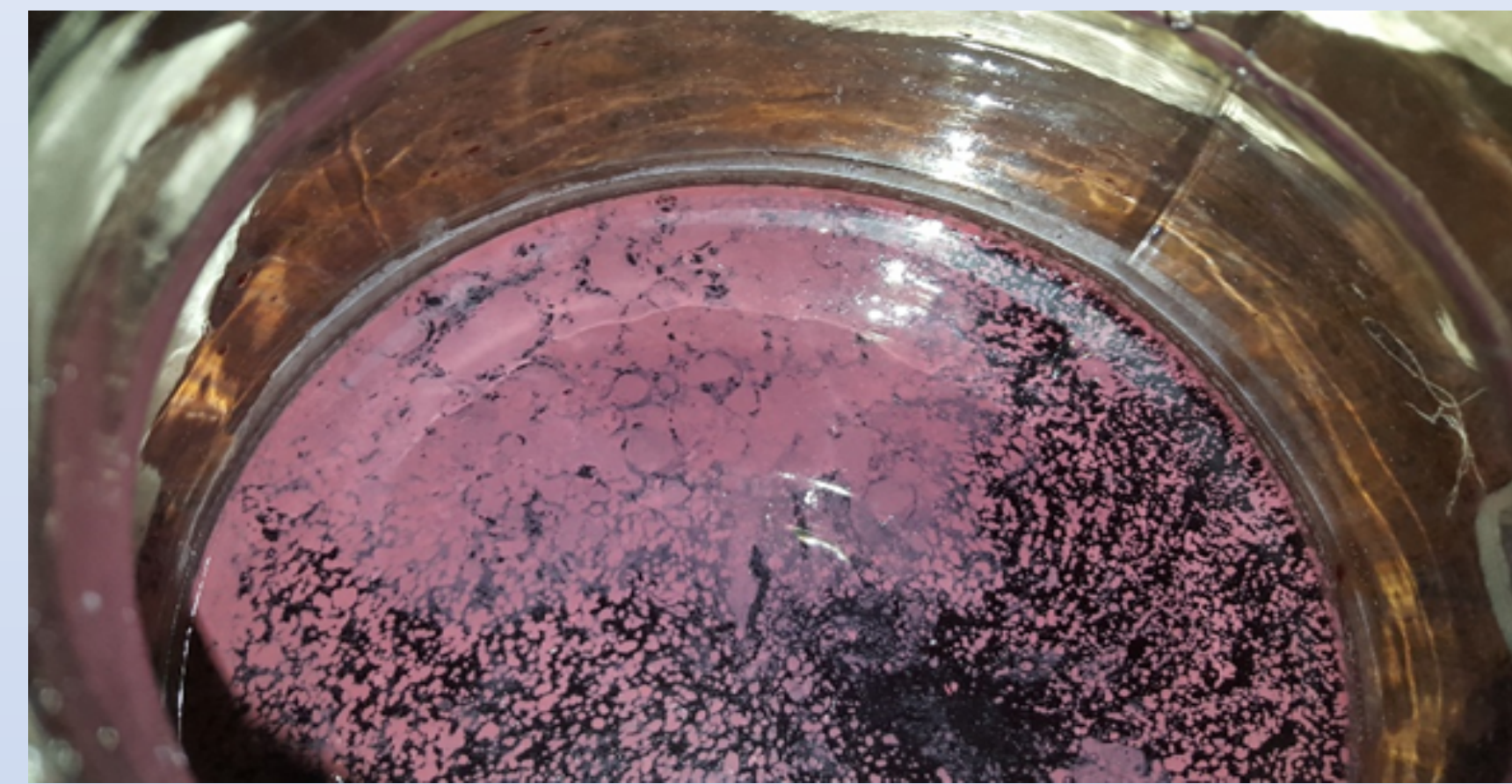


Fig. 1 Static system fermentation

Prototypal acetification processes conducted by a selected starter culture "SSC" (*Acetobacter pasteurianus* - UMCC 1754), tested in different conditions, as well as normally used systems.

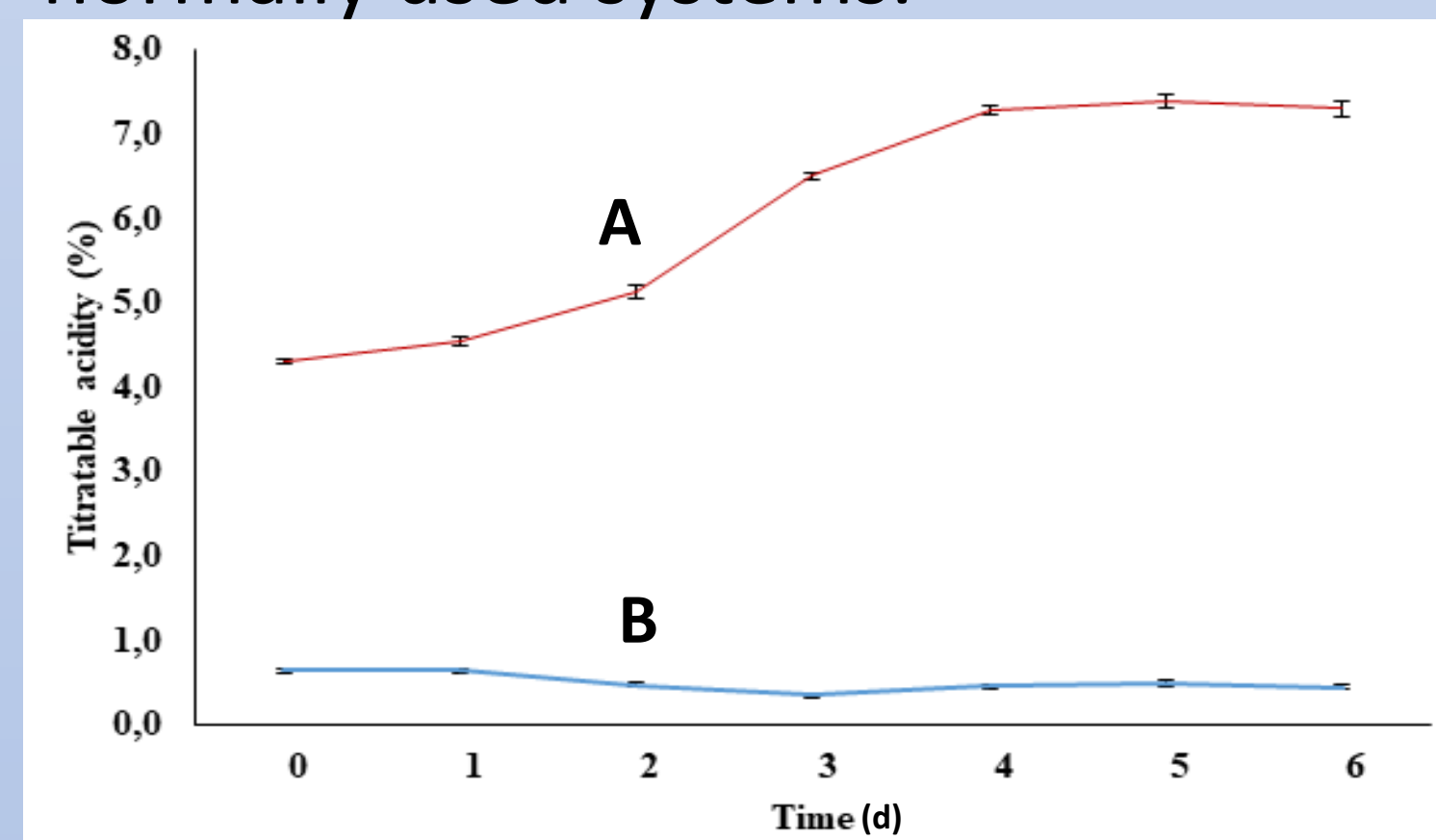


Fig. 3. Trend of titratable acidity in two independent acetification tests. A. culture inoculated with SSC. B. Test without SSC

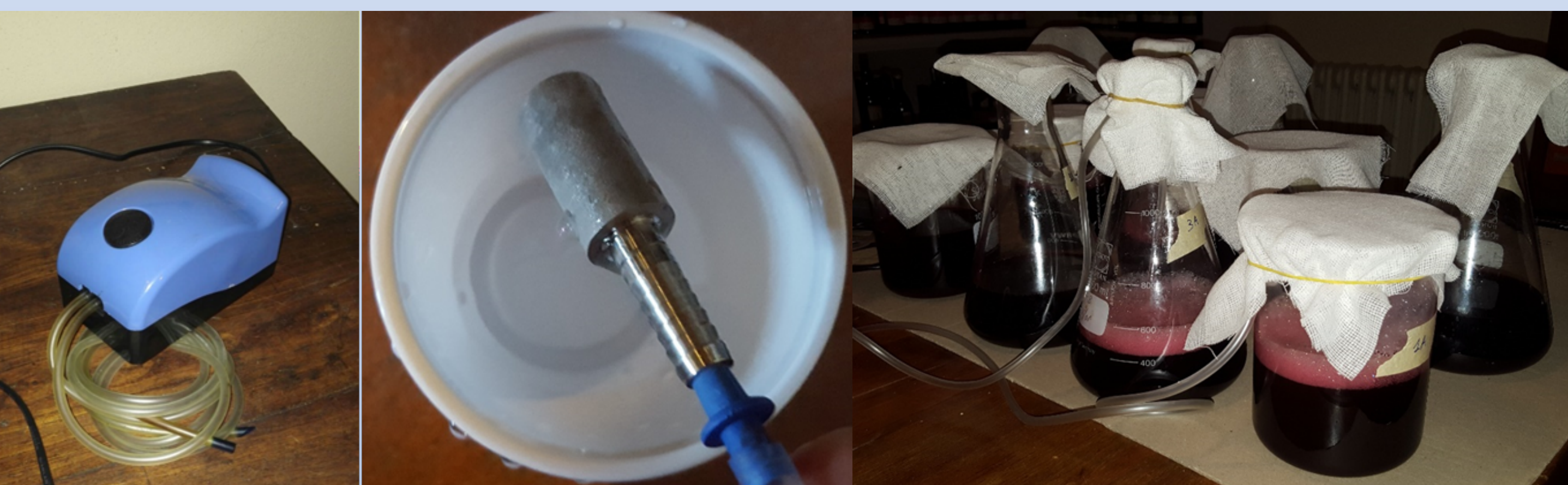


Fig. 2. Prototypal acetification processes in static system and with forced aeration

The fermentation processes of wine were developed in static systems with different aeration conditions and checked every 3 days for ethanol, titratable acidity and pH;

A - aeration active from the beginning

B - aeration activated after 3 days

C - No aeration

Outputs

It is possible to build up **user-friendly acetification systems** by the use of selected starter culture and a customized monitoring system.

Ongoing activity

Development of a user-friendly kit for non-specialized users composed of a selected starter culture and process facilities (aerator, pH meter, a special vessel for the fermentation).

BEAKER (500 mL)					
Time	Titratable acidity (g/100 mL)	Ethanol (% v/v)	Dissolved oxygen (%)	pH	Operation
Test "A"					
T0	6.00	4.5	18.2		Aerator on
T1	7.59	2.6	50.0	3.27	
T2	7.65	1.4	~ 0.0	3.24	
T3	7.81	1.0	32.0	3.20	+ 50 mL wine
T4	8.13	0.4	~ 0.0	3.18	
Test "B"					
T0	6.00	4.5	18.2		
T1	7.59	3.0	~ 0.0	3.24	Aerator on
T2	7.76	2.0	55.0	3.22	
T3	7.91	1.8	20.0	3.18	+ 50 mL wine
T4	8.94	0.3	~ 0.0	3.14	
Test "C"					
T0	6.00	4.5	18.2		
T1	6.71	3.4	~ 0.0	3.27	
T2	7.53	2.5	5.0	3.24	
T3	7.58	2.4	3.0	3.21	+ 50 mL wine
T4	7.59	2.4	~ 0.0	3.23	

ERLENMEYER FLASK (500 mL)					
Time	Titratable acidity (g/100 mL)	Ethanol (% v/v)	Dissolved oxygen (%)	pH	Operation
Test "A"					
T0	6.00	4.5	18.2		Aerator on
T1	6.99	3.3	45.0	3.24	
T2	7.17	n.d	32.0	3.21	
T3	7.77	2.0	3.0	3.18	+ 50 mL wine
T4	7.62	1.3	0.0	3.25	
Test "B"					
T0	6.00	4.50	18.2		
T1	6.83	4.30	~ 0.0	3.29	Aerator on
T2	6.93	3.70	55.0	3.25	
T3	6.98	3.70	32.0	3.26	+ 50 mL wine
T4	7.06	3.50	~ 0.0	3.24	
Test "C"					
T0	6.00	4.50	18.20		
T1	6.22	4.30	~ 0.0	3.33	
T2	6.48	4.00	10.0	3.24	
T3	6.18	4.30	7.00	3.26	+ 50 mL wine
T4	8.01	2.40	~ 0.0	3.02	

Table 1. Acetification tests in beakers and Erlenmeyer flasks. A. Test with forced aeration. B. Test with forced aeration from T1 (after 3 days). C. Test without aeration (static system).